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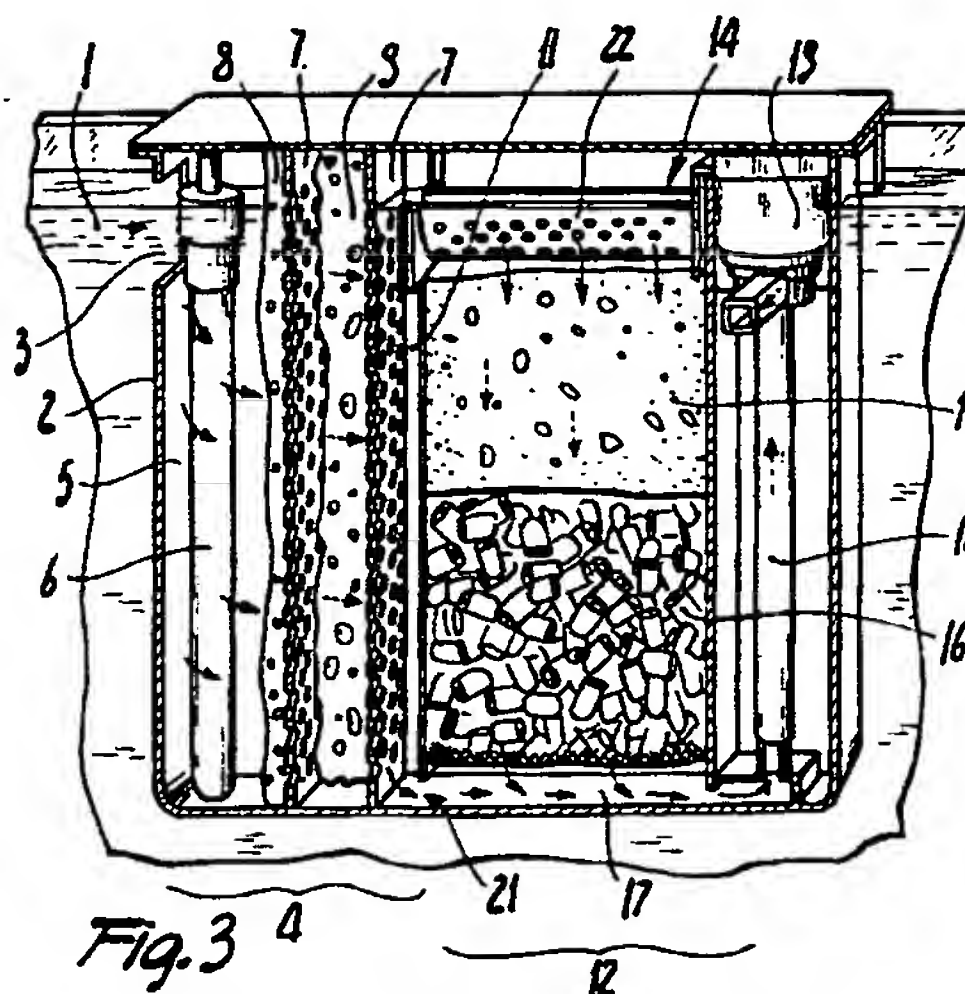
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(54) **Aquarium filter.**

(57) Aquarium filter having a box-like body (2) defining a first mechanical filtration region provided with mechanical-action filtration means (8-10) and a second biological filtration region having a chamber (14) provided with biological-action filtration masses (15,16) which are crossed in a downward direction by fluid at low speed. The second region (12) is provided, in a downward position, with a collection channel system (17) which is connected to the intake duct (18) of a recirculation pump (19) and with a bypass opening (21) which deflects part of the water arriving from the first region (4) directly into the channel system (17).



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The present invention relates to an aquarium filter.

The filter can be used particularly as an internal filter with biological and mechanical action.

Various types of aquarium filters with biological action, i.e. filters which have a filtration mass suitable for containing a large amount of bacteria for rapidly decomposing the contaminants which form in the water, are currently commercially available.

Said filtration masses are generally constituted by highly porous material suitable for acting as an ideal support for the rapid and abundant settling of bacteria.

Biological filtration requires a low water transit speed in order to allow a better settling of the bacterial flora and a more effective action thereof.

It has furthermore been shown that the bacterial flora, which constitutes the biological filtration medium, is maximally effective and powerful if the water to be purified is placed in contact with a large amount of oxygen.

The presence of a filter with mechanical action is also necessary inside an aquarium; however, the best action of said filter occurs with a high transit speed through the filtration medium.

The technical aim of the present invention is to provide an aquarium filter which combines a mechanical filtration action with a biological one.

A consequent primary object is to provide a filter in which the water flows rapidly in the part with mechanical action and slowly in the part with biological action.

Another important object is to provide a filter in the biological-action part of which an air-water exchange occurs.

Another important object is to provide a biological filter which keeps the recirculation pump constantly operating in water, so as to avoid wear, noise and severe damage thereof.

Not least object is to provide a filter which can be manufactured with conventional machines and facilities.

This aim, these objects and others which will become apparent hereinafter are achieved by an aquarium filter comprising a box-like body which defines a first mechanical filtering region provided with mechanical-action filtration masses, and a second biological filtering region having a chamber for biological-action filtration masses which are crossable by fluid in a downward direction, said second region being downwardly provided with a collecting channel system which is connected to an intake duct of a recirculation pump and with a bypass opening which is suitable for deflecting part of the water arriving from the first region directly into said channel system.

Advantageously, said recirculation pump has low head and high capacity characteristics.

Further characteristics and advantages of the invention will become apparent from the detailed description of an embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a longitudinal sectional view of the filter according to the invention;

figure 2 is a longitudinal sectional view of a further aspect of the filter of the present invention;

figure 3 is a sectional perspective view of the filter of figure 1.

With reference to the above figures, the aquarium filter according to the invention, conveniently arrangeable inside an aquarium 1, comprises a box-like body 2 which is made of plastic material and which has, for example, a parallelepipedal shape.

On one side, said box-like body 2 has an opening 3 which connects to the outside a first region 4 which is horizontally crossed by the water and which comprises a space 5, which is free from filtration masses and in which it is possible to conveniently arrange for example a heater 6 which can be thermostat-controlled.

The first mechanical filtration region 4 has, after the space 5, partitions 7 which are conveniently provided with perforations or meshes so as to allow the flow of water and which are suitable for defining chambers for containing mechanical-action filtration masses.

A first filtration mass, indicated by 8, is constituted by a pre-filter, for example made of coarse pointed sponge, whereas a second filtration mass, indicated by 9, is constituted for example by a natural or synthetic sponge.

An additional chamber, arranged after the second mass 9 as seen in figure 2, can contain a third filtration mass 10, for example constituted by activated carbon or peat.

An empty chamber 11 is preferably arranged after the filtration masses and is followed by a second biological filtration region 12.

In particular, said second region 12 comprises a partition 13 which defines a chamber 14 inside which a first biological-action filtration mass 15, constituted for example by a brick made of porous ceramic or of ceramic sponge, is arranged upwardly, and a second biological-action filtration mass 16, for example constituted by sections of ceramic tubes, is arranged downwardly.

A collecting channel system 17 is defined in the chamber 14 below the second biological-action filtration mass 16 and is connected to the intake tube 18 of a recirculation pump 19 which is arranged in the upper part of said box-like body 2.

Said partition 13 has only two openings: an upper one 20, suitable for supplying the biological filtration masses, and a gauged lower one 21, suitable for bypassing part of the water contained in the chamber 11 toward the channel system 17.

A distribution means 22 is associated with said upper opening 20 and is conveniently constituted by a horizontal element which defines a concavity directed upwardly and which forms a channel with perforations which pour water onto the filtration mass 15 with a sort of sprinkler-like effect.

The biological filtration masses are therefore crossed by the water at low speed in a descending direction.

Said recirculation pump 19 conveniently has low head and high capacity characteristics and is therefore considerably influenced by the level which is established in the chamber 14.

The cross-section of the lower bypass opening 21 is gauged so that a level which substantially corresponds to the separating region between the two filtration masses is established in the chamber 14 as a function of the characteristics of the pump 19.

In this manner, there is a very intense air-water-ceramic sponge exchange, and therefore an excellent biological action, in the mass 15 into which the water falls at low speed from the distribution element 22, whereas the mass 16 is completely immersed in water.

When the water level of the aquarium decreases, the water level in the chamber 14 decreases accordingly, and the pump 19 reduces its capacity but never remains without water by virtue of the supply which flows through the bypass opening 21.

The decrease in the capacity of the pump 19 restores the level in the chamber 14.

As regards the mechanical-action filters, they are crossed by a flow of water at high speed, which is optimum for their best performance.

From what has been described above it is thus evident that the filtration due to the biological-action masses is independent of the emptyings, currently due to the action of timer-controlled devices, and fillings of the regions in which said masses are located.

This entails greater structural simplicity for the filter, as well as its better operation, considering the fact that part of the biological-action filtration masses is constantly subjected to an air-water exchange effect.

The recirculation pump operates constantly in water and is thus not exposed to the risk of wear or damage due to possible operation in air.

The constant operation of the pump in water also avoids the onset of noise.

In practice it has thus been observed that the aquarium filter according to the invention has achieved the intended aim and objects.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, so long as compatible with the contingent use, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

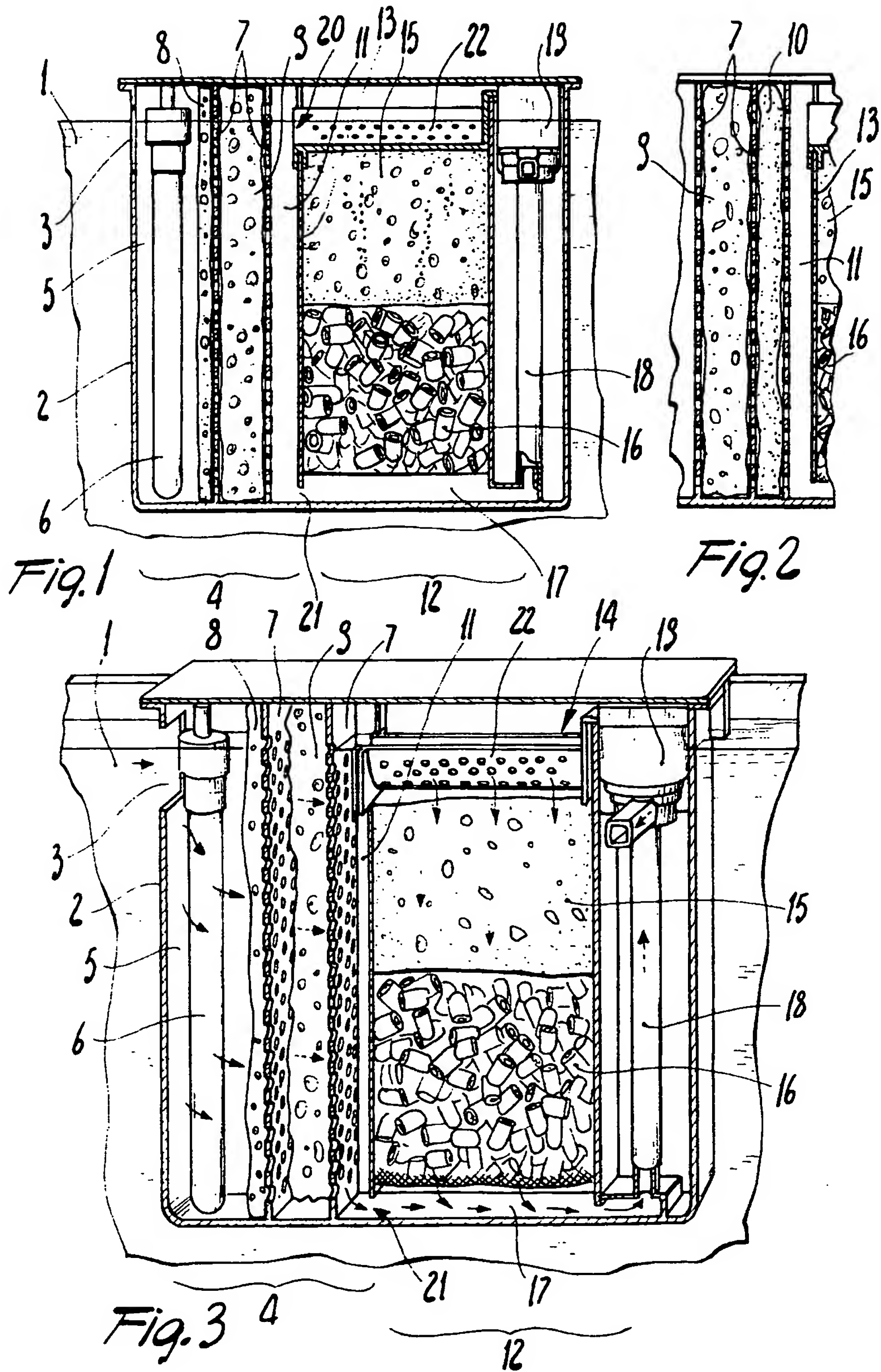
## Claims

1. Aquarium filter comprising a box-like body (2) which defines a first mechanical filtration region (4) provided with mechanical-action filtration masses (8-10), and a second biological filtration region (12) having a chamber (14) for biological-action filtration masses (15,16) which are crossable by fluid in a downward direction, said second region (12) being downwardly provided with a collecting channel system (17) which is connected to an intake duct (18) of a recirculation pump (19) and with a bypass opening (21) which is suitable for deflecting part of the water arriving from said first region (4) directly into said channel system (17).
2. Aquarium filter according to claim 1, characterized in that a first one (8) of said mechanical-action filtration masses, which are mutually separated by perforated or meshed partitions (7), is constituted by coarse pointed sponge or by an equivalent material and a second one (9) is constituted by natural or synthetic sponge or by an equivalent material.
3. Aquarium filter according to claim 2, characterized in that said mechanical-action filtration masses comprise a third mass (10) which is constituted by carbon or peat or equivalent materials.
4. Aquarium filter according to claim 1, characterized in that said first region (4) comprises an empty chamber (11) which is arranged downstream of the filtration masses (8-10).

5. Aquarium filter according to claim 1, characterized in that said first region (4) comprises a space (5) which is free from filtration masses for a heater (6) which can be thermostat-controlled. 10
6. Aquarium filter according to claim 1, characterized in that said chamber (14) for biological-action filtration masses is divided from said first region (4) by a partition (13) which is exclusively provided with an upper opening (20) and with said bypass opening (21) at a lower end thereof. 15
7. Aquarium filter according to claim 6, characterized in that a tubular or semi-tubular horizontal distribution element (22) is associated with said upper opening (20) of said partition (13) and is downwardly provided with perforations suitable for distributing the water arriving from said first region (4) toward said biological-action filtration masses (15,16) with a sprinkler-like effect. 20
8. Aquarium filter according to claim 7, characterized in that said biological-action filtration masses arranged between said distribution element (22) and said lower channel system (17) comprise an upper ceramic sponge (15), or equivalent material, and lower sections of ceramic tubes (16), or equivalent elements. 25 30
9. Aquarium filter according to one or more of the preceding claims, characterized in that said pump (19) has low head and high capacity characteristics. 35
10. Aquarium filter according to one or more of the preceding claims, characterized in that the cross-section of said bypass opening (21) is such that the suction of the pump (19) produces in said chamber (14) which contains the biological-action filtration masses (15,16) a fluid level which substantially corresponds to the separating line between the upper mass (15) and the lower mass (16). 40 45
11. Aquarium filter according to one or more of the preceding claims, characterized in that said mechanical-action filtration masses (8-10) are arranged vertically and are crossed by the water flow horizontally. 50
12. Aquarium filter according to one or more of the preceding claims, characterized in that said mechanical-action filtration masses (8-10) are 55

crossed by a high-speed flow, said biological-action masses (15,16) being crossed by a low-speed fluid flow.

- 5 13. Aquarium filter according to one or more of the preceding claims, characterized in that said pump (19) is arranged inside said box-like body (2) in its upper part.





European Patent  
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# EUROPEAN SEARCH REPORT

Application Number

EP 91 11 8895

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 915 828 (MEYERS)  * abstract; figure 1 * ---	1, 7, 11, 13	A01K63/04
A	FR-A-2 298 946 (KATO YUKIO) ---		
A	EP-A-0 244 904 (MINIREEF B.V.)  -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A01K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 17 JANUARY 1992	Examiner VON ARX V. U.
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